shows a connection **2903**, which forms a connection between a common ITO layer described below and xVcom **2621** through connection point **2623** and a connection **3001** shown in FIG. **30**.

[0147] FIG. **31** shows a second layer of transparent conductor, such as ITO, formed on pixel **2501** and pixel **2502**. The second layer on pixel **2502** forms a common electrode **3151**, which includes a connection point **3153** that connects to xVcom **2621** through connections **3001** and **2903**, and connection point **2623**. FIG. **31** also shows a portion **3155** of a common electrode of a pixel adjacent in the y-direction. Like pixel **2502**, pixel **2501** includes a common electrode **3101** formed of the second layer of transparent conductor. Likewise, common electrode **3101** includes a connection point **3103** that connects to xVcom **2621** through connections **3001** and **2903**, and connection point **2623**. However, pixel **2501** also includes a connection **3107** between common electrode **3101** and a common electrode **3105** of a pixel adjacent in the y-direction. In this way, the common electrodes of pixels can be connected in the y-direction to form a yVcom line **3109**. Because common electrode **3101** is connected to xVcom **2621** and xVcom **2621** is connected to common electrodes of other pixels in the x-direction, the common electrodes of a region of pixels can be connected together to form a touch sensing element. Similar to the previous example embodiment, breaks in xVcom lines and yVcom lines can create separate regions of linked-together common electrodes that can be formed as an array of touch sensors.

[0148] FIG. **32** shows a plan view of completed pixels **2501** and **2502**. FIG. **33** illustrates a side view of pixel **2501** taken along the lines shown in the top view shown in the figure.

[0149] FIG. **34** illustrates the storage capacitance of a pixel **2501** and a pixel **2502**.

[0150] FIGS. **35-43** are directed to another example IPS LCD display using LTPS. In the present example, a yVcom line is formed in an M2 layer (in comparison to the previous example IPS LCD display, in which a yVcom line is formed in a common ITO layer). An example process of manufacturing an IPS LCD display using LTPS with an M2 layer yVcom line according to embodiments of the invention will now be described with reference to FIGS. **35-41**. The figures show various stages of processing of two pixels, a pixel **3501** and a pixel **3502**, during the manufacture of the example IPS LCD display. The resulting pixels **3501** and **3502** form electrical circuits equivalent to pixels **101** and **102**, respectively, of FIG. **1**.

[0151] FIG. **35** shows the patterning of a layer of poly-Si of pixels **3501** and **3502**. Semiconductor portions **3505**, **3507**, and **3509** form the active region of a TFT of pixel **3501**, and serve as source, gate, and drain, respectively. Likewise, semiconductor portions **3506**, **3508**, and **3510** are the source, gate, and drain, respectively, of pixel **3502**. FIG. **35** also shows that pixel **3501** has the width W' (in the x-direction) that is slightly greater than the width W of pixel **3502**.

[0152] FIG. **36** shows a subsequent patterning step in the process of manufacturing pixels **3501** and **3502**, in which a first metal layer (M1) of pixels **3501** and **3502** is formed. As shown in FIG. **36**, the M1 layers of pixels **3501** and **3502** include gates **3605***a* and **3606***a*, portions **3613***a* and **3613***b* of a gate line **3613** (shown as dotted lines), and portions **3621***a* and **3621***b* of xVcom **3621**. Portions **3621***a* and **3622***a* include connections points **3623** and **3624**, respectively. Gate line **3613** and xVcom **3621** run through pixels that are adjacent in the x-direction.

[0153] FIG. **37** shows vias **3701**, **3703**, and **3705** formed in pixels **3501** for connections to portion **3505**, portion **3509**, and connection point **3623**, respectively. Vias **3702**, **3704**, and **3706** formed in pixels **3502** for connections to portion **3506**, portion **3510**, and connection point **3624**, respectively.

[0154] FIG. **38** shows patterning of a second metal layer (M2) of pixels **3501** and **3502**. For pixel **3501**, the M2 layer forms a portion **3817***a* of a color data line **3817** (shown as a dotted line in FIG. **38**), which could carry red, green, or blue color data, for example. Portion **3817***a* includes a connection **3819** that connects to portion **3505** through via **3701**. Pixel **3501** also includes a portion **3830***a* of a yVcom **3830** (shown as a dotted line), which includes a connection **3823** to connection point **3623** through via **3705**. Thus, yVcom **3830** is connected to xVcom **3621**. Pixel **3501** also includes a connection **3821** with portion **3509** through via **3703**.

[0155] Because yVcom **3830** is connected to xVcom **3621** and xVcom **3621** is connected to common electrodes of other pixels in the x-direction, the common electrodes of a region of pixels can be connected together to form a touch sensing element. Similar to the previous example embodiment, breaks in xVcom lines and yVcom lines can create separate regions of linked-together common electrodes that can be formed as an array of touch sensors.

[0156] For pixel **3502**, the M2 layer forms a portion **3818***a* of a color data line **3818** (shown as a dotted line in FIG. **38**), which could carry red, green, or blue color data, for example. Portion **3818***a* includes a connection **3820** that connects to portion **3506** through via **3702**. Pixel **3501** also includes a connection **3824** to connection point **3624** through via **3706**, and a connection **3822** with portion **3510** through via **3704**.

[0157] FIG. **39** shows a first layer of transparent conductive material, such as ITO, formed on pixels **3501** and **3502**. The first transparent conductor layer includes pixel electrodes **3901** and **3905**. FIG. **39** also shows connections **3903** and **3907**, which form connections between a common ITO layer described below and xVcom **3621** through connection points **3623** and **3624** and connections **4001** and **4002**, respectively, shown in FIG. **40**.

[0158] FIG. **41** shows a second layer of transparent conductor, such as ITO, formed on pixel **3501** and pixel **3502**. The second layer on pixel **3502** forms a common electrode **4107**, which includes a connection point **4105** that connects to xVcom **3621** through connections **4002** and **3907**, and connection point **3624**. Like pixel **3502**, pixel **3501** includes a common electrode **4101** formed of the second layer of transparent conductor. Likewise, common electrode **4101** includes a connection point **4103** that connects to xVcom **3621** through connections **4001** and **3903**, and connection point **3623**.

[0159] FIG. **42** shows a plan view of completed pixels **3501** and **3502**. FIG. **43** illustrates a side view of pixel **3501** taken along the lines shown in the top view shown in the figure.

[0160] FIGS. **44-55** are directed to an example ECB LCD display using LTPS. Like the ECB LCD display using amorphous silicon (a-Si) (shown in FIGS. **11-24**), the process of manufacturing the ECB LCD display using LTPS includes construction of vias and additional M2 lines to form yVcom lines that connect the storage capacitors of pixels in the y-direction.

[0161] An example process of manufacturing an ECB LCD display using LTPS according to embodiments of the invention will now be described with reference to FIGS. **44-50**. FIG. **44** shows a semiconductor layer of poly-Si. FIG. **45**